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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,521	10/06/2003	Charles J. Neef	32850	3997

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EXAMINER	
ASHTON, ROSEMARY E	
ART UNIT	**PAPER NUMBER**
1752	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

LW

Office Action Summary	**Application No.** 10/679,521	**Applicant(s)** NEEF ET AL.	
	Examiner Rosemary E. Ashton	**Art Unit** 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 3/16/2005.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-3, 5-24, 26-45, 47-57 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _____ is/are rejected. 1-3, 5-24, 26-45, 47-57.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's arguments with respect to claims 1-56 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. Office action The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior.

3. Claims 24,26-29,44,45,47,52-57 are rejected under 35 U.S.C. 102(e) as being anticipated by Pavelchek et al U.S. patent no. 6,316,165 cited in the prior office action.

Pavelchek teaches a planarizing antireflective coating (ARC) for use with a photoresist and photolithographic method.

As shown in Figure 1 the substrate has a hole defined by a bottom wall and sidewalls. This limitation was added in claims 24 by including the subject matter of claim 26 into claim 24 and in the precursor of new claim 57.

Pavelchek teaches applying a composition comprising a solvent and a plurality of components with at least about 95% of the components having a molecular wt. of less than about 5,000 g/mole of component as shown below.

In example 3 (Ex.3) Pavelchek teaches that a polymer for an ARC composition may have a low molecular weight of 2337 (Ex.3). The ARC compositions are shown in Ex. 5 and Ex. 6 where a polymer having a mole wt of 8355 is used. The polymer is combined with a crosslinker (Powderlink 1174), a photoacid generator (PAG) and an acid (p-toluenesulfonic acid). Examples 1 and 2 teach a polymer having a mole wt of

8355 and 6304, respectively, however, based on the patent teaching only four polymers for the invention and claims 4 and 5 teach the polymer has a mole wt less than 5000 or 3000, respectively, one envisions using the polymers of Ex. 3 and Ex. 4 in the ARC composition of Examples 5 and 6.

The crosslinker component Powderlink 1174 and the acid component p-toluenesulfonic acid in the composition of Ex.5 are identical to the components taught on page 6 of the instant application. The amount of crosslinker (11%) is less than 25 % wt. as taught on page 6 of the specification of the instant application.

The photoacid generator in Ex. 5 has a mole wt. of 624 and the acid a mole wt of 192 (including the monohydrate), thus, the components meet the limitations in that at least about 98 % of said components have a mole wt of less than about 5,000 and at least about 95 % of said components have a mole wt of less than about 2,000.

As shown in Ex. 5 the composition is mixed with ethyl lactate as a solvent, coated on a silicon substrate, cured by heating to 175 deg. C, coated with a photoresist composition, exposed to radiation and developed as in claims 24,26-29.

As to claims 44,45,47 in Ex. 5 Pavelchek teachs a precursor structure having the ARC next to a photoresist layer with a silicon substrate. As shown in col.3, lines 34-38, the ARC composition is used for exposure at 193 nm, thus it will absorb at least 95 % of light at this wavelength because the purpose of a bottom ARC composition is to absorb essentially 100% of the light to limit reflection back into the photoresist layer so photoresist patterns have good shape and resolution.

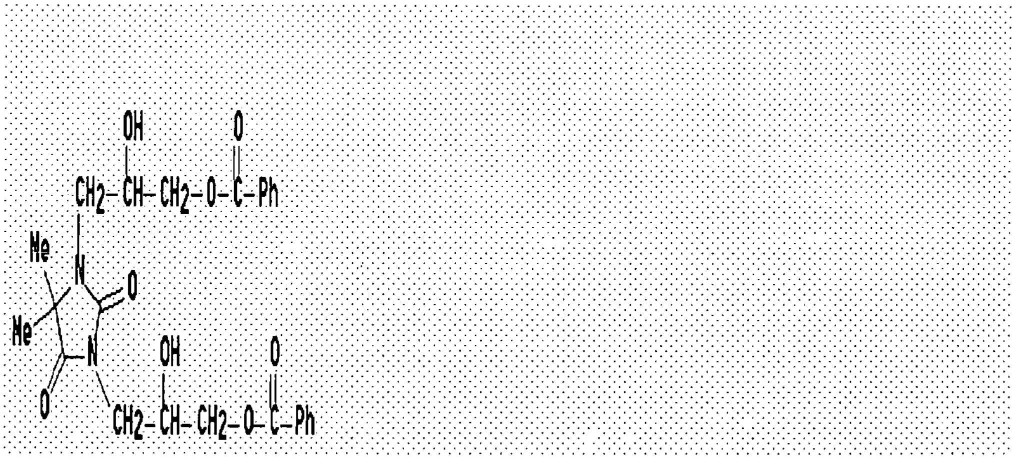
As to claims 52-56: In col. 6, lines 7-11, Pavelchek teaches:

> *Also, while less preferred, a preformed resin may be functionalized with chromophore units. For example, a glycidyl phenolic resin such as a glycidyl novolac can be reacted with an anthranyl carboxylic acid.*

The compound formed by reacting the epoxy (glycidyl) novolac with anthranyl carboxylic acid is the compound claimed in these claims where X is an anthracene group and R is H.

4. Claims 52,53,56 are rejected under 35 U.S.C. 102(b) as being anticipated by Chemcats Abstract AN 2002:2742256 published 9 July 2002 cited in the prior office action.

The abstract teaches the compound below which meets the limitations of claims 52-54 and 56 wherein Ph is a benzene ring.



Claim Rejections - 35 USC § 103

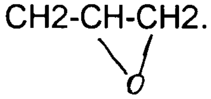
5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3,5-24,30-43,48-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Palvechek cited in the prior office action in view of Levy et al patent no. 3,776,729.

As shown above Pavelchek teaches an ARC composition meeting the limitations of having a plurality of components with at least about 95% of the components having a molecular wt. of less than about 5,000 g/mole of component. Ex. 5 teaches a precursor structure as in claim 48.

In col. 6, lines 7-11, Pavelchek teaches a polymer used in the invention may be a glycidyl novolac reacted with an anthracene carboxylic acid. A glycidyl novolac is a novolac resin with an epoxy group of

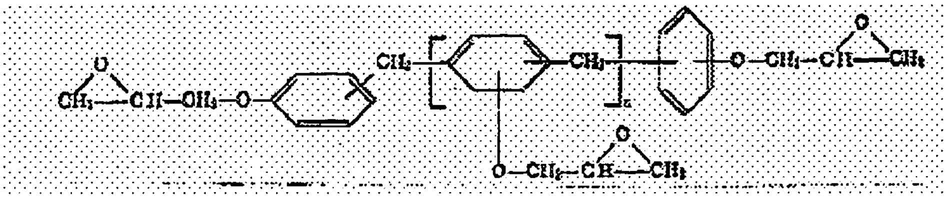


$\underset{O}{\mathrm{CH_2\text{-}CH\text{-}CH_2}}$.

> *Also, while less preferred, a preformed resin may be functionalized with chromophore units. For example, a glycidyl phenolic resin such as a glycidyl novolac can be reacted with an anthranyl carboxylic acid.*

Reaction with anthracene carboxylic acid gives applicant's claimed invention of forming a product meeting the limitations of claims 8-11 where in claim 10 R is H, X is an anthracene ring and the circle is an aromatic ring.

Levy teaches an epoxy novolac ring having the formula below with a mole wt. of 1000 to 4000. In col. 4, lines 55-65, Levy teaches the following epoxy novolac resin.



The resin has three epoxy groups for reaction with the carboxylic acid of the anthracene ring thus forming three groups of X-C(O)O-CH2-C(OH)-CH2 as claimed.

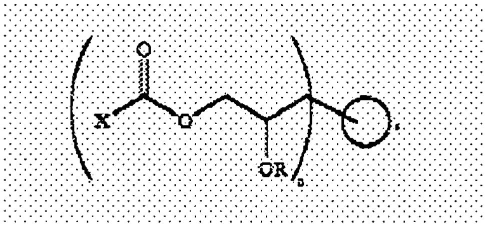
As shown in paragraph 3, above, the ARC also has an aminoplast crosslinking agent, sulfonic acid and a solvent of ethyl lactate as in claims 13-15 and 21-23.

As to claim 50: in col.3, lines 34-38, the ARC composition is used for exposure at 193 nm, thus it will absorb at least 95 % of light at this wavelength because the purpose of a bottom ARC composition is to absorb essentially 100% of the light to limit reflection back into the photoresist layer so photoresist patterns have good shape and resolution.

(i) It would have been obvious to one of ordinary skill in the art to use the epoxy novolac polymer taught in Levy reacted with anthranyl carboxylic acid as taught in Pavelchek for the polymer in the ARC composition of Pavelchek with a reasonable expectation of obtaining a conformal ARC because Pavelchek teaches a resin comprising a glycidyl novolac reacted with an anthranyl carboxylic acid can be used in the invention to obtain an ARC that is highly planarizing (col. 2, lines 10-15).

As to claims 30,31 which are dependent on claim 24, and are directed to a method, as shown above Pavelchek teaches the method of claim 24, however, it does not teach the composition comprises a compound having two or more epoxy groups reacted with a light attenuating compound as in claim 30 and 31. Levy teaches this compound.

As to claims 32-43 which teaches the method of Ex. 5 in Pavelchek but does not teach the compound meeting the formula of claim 32 shown below.



The polymer formed by reacting the epoxy groups of the epoxy novolac resin with anthranyl carboxylic acid as taught in section (i) above meets the limitations of claim 32. The subject matter in claims 33-43 has been addressed in the 102 rejection over Pavelchek above in that Figure 1 and Ex.5 teaches the method steps of these claims.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosemary E. Ashton whose telephone number is 571-272-1326. The examiner can normally be reached on Mon-Fri, 11:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rosemary E. Ashton
Primary Examiner
Art Unit 1752

June 11, 2005

ROSEMARY ASHTON
PRIMARY EXAMINER